(12) UK Patent Application (19) GB (11) 2 338 700 (13) A

(43) Date of A Publication 29.12.1999

(21) Application No 9813380.4

(22) Date of Filing 23.06.1998

(71) Applicant(s)
Philip Walter Strong
Elmsleigh, Featherbed Lane, Oldbury on Severn, BRISTOL, BS12 1PP, United Kingdom

(72) Inventor(s)
Philip Walter Strong

(74) Agent and/or Address for Service
K R Bryer & Co
7 Gay Street, BATH, BA1 2PH, United Kingdom

(51) INT CL^6
A61G 7/10

(52) UK CL (Edition Q)
B8H HLD

(56) Documents Cited
WO 96/14817 A1 WO 96/06550 A1 US 4944053 A

(58) Field of Search
UK CL (Edition Q) B8H HLD
INT CL^6 A61G 7/10
ONLINE : WPI,EDOC,JAPIO

(54) Abstract Title
Patient transfer aid

(57) A patient transfer aid of the type where transfer is effected by the sliding or rolling of one layer of flexible woven sheet material having a low coefficient of friction over another, wherein during the sliding or rolling movement of normal use the warp and weft fibres of the two layers of material are inclined to the main directional component of the sliding or rolling movement. Preferably, the aid is made by cutting on the bias so that the angle of inclination of the fibres is between 20 and 70 degrees.

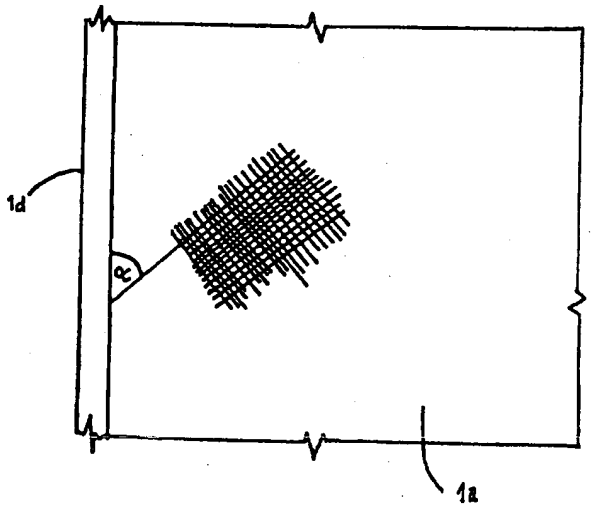
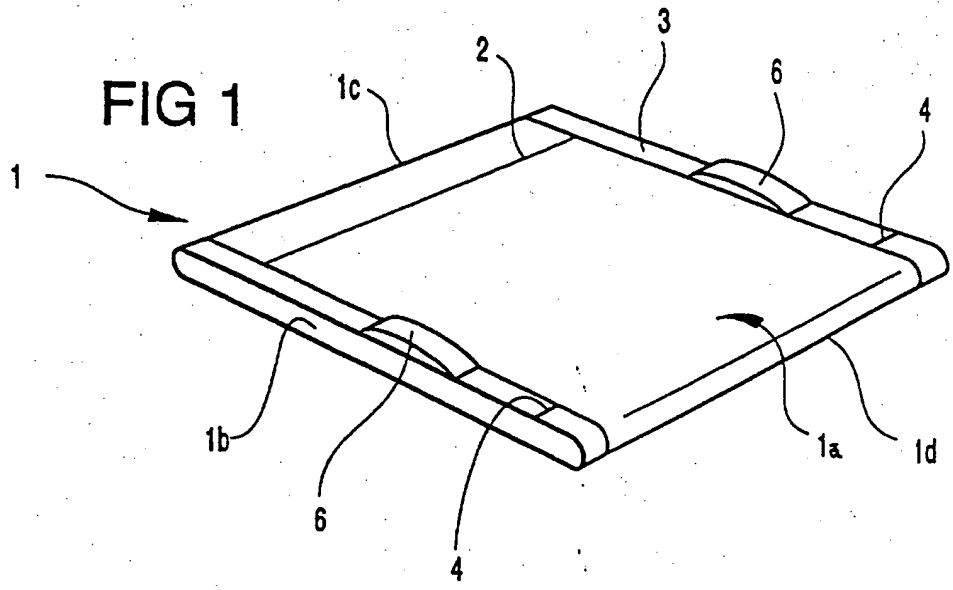


FIG 2

GB 2 338 700 A

FIG 1



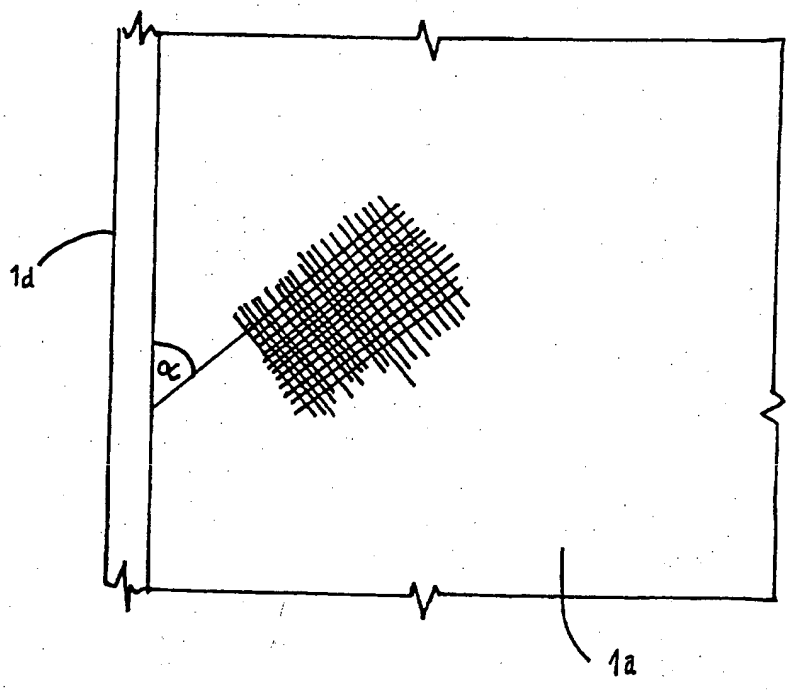


FIG 2

FIG 3A

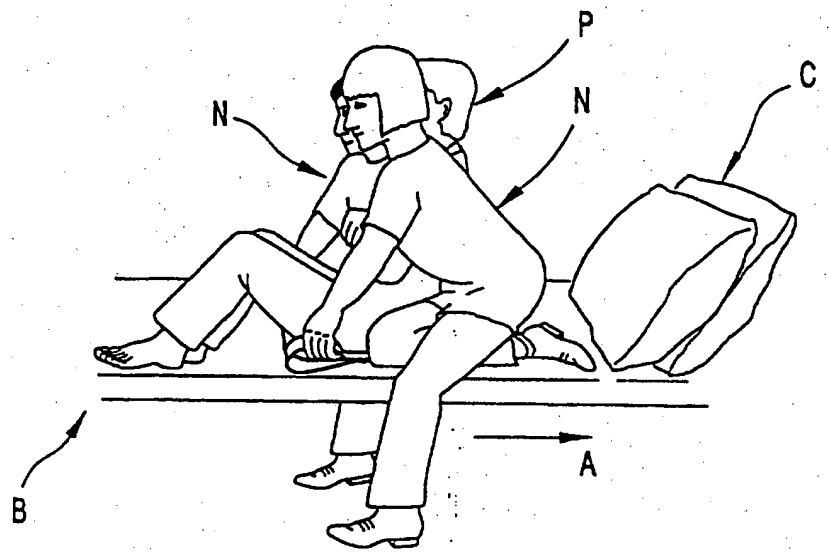
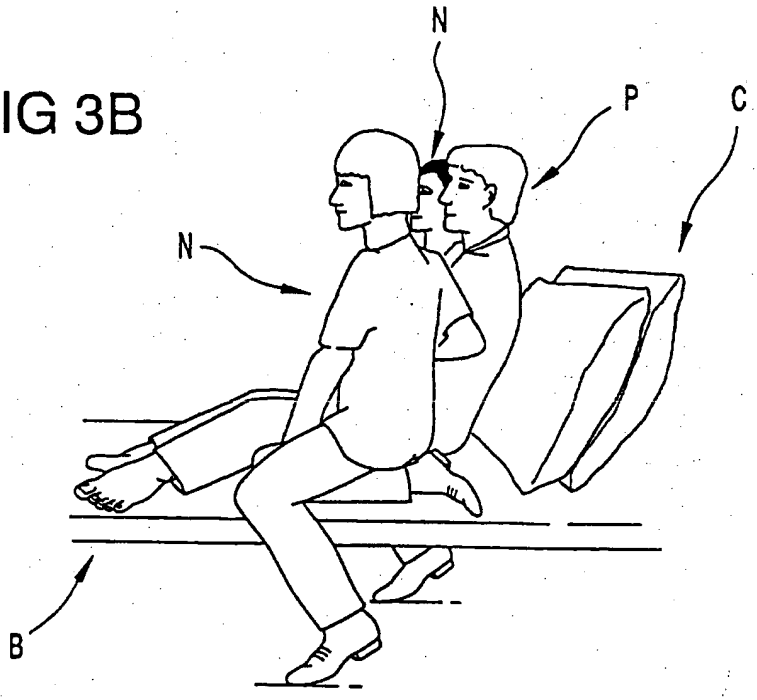


FIG 3B



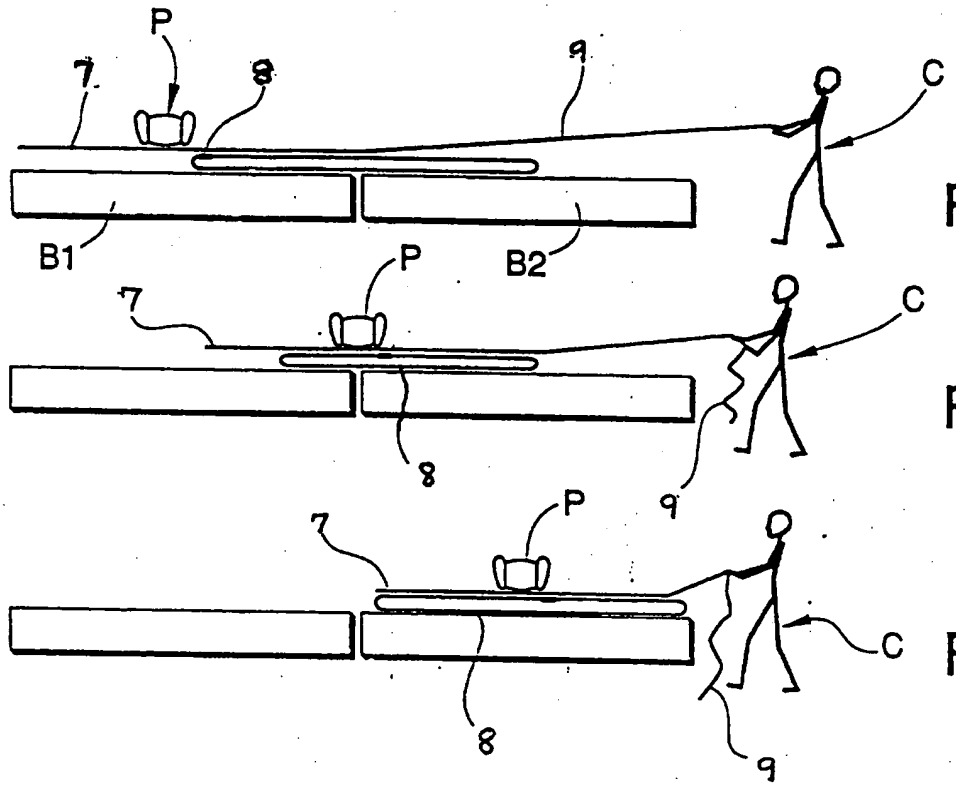


FIG 4a

FIG 4b

FIG 4c

PATIENT TRANSFER AID

This invention relates to an aid for use in the transfer and repositioning of patients.

It is well known that considerable effort needs to be exerted by any one person to move another human being manually. Aids have, therefore, been developed to assist persons, such as hospital staff or care assistants, who need to move people frequently during the course of their work, in order to reduce the strain and fatigue involved. Indeed such aids are becoming ever more necessary in order to comply with national and regional legislation, such as the EC directive on the handling of loads.

One such aid which has been developed is generally known as a sliding or rolling transfer aid and consists of a flexible sheet material which can be doubled, i.e. one part folded on top of the other, to form an open-ended, cylindrical tube in which two parts of the sheet are superimposed one on the other. The contact surfaces of the two superimposed parts of the sheet are made of a low-friction material. When the doubled sheet is placed on a supporting surface, e.g. a bed, stretcher, operating table or the like, a patient who is to be moved can be gently manoeuvred onto the sheet and once in position can be gently moved or transferred as desired by the sliding or rolling of the two parts over each other in a

direction generally perpendicular to the axis of the collapsed tube formed by the doubled sheet material. The friction between the patient and the uppermost part of the sheet material causes the patient to remain on that uppermost layer and move therewith as its slides on the lower part of the sheet. For some applications the lateral edges of the sheet may be joined together so that a permanent tube is formed which acts in use similarly to a conveyor belt, with the uppermost parts of the sheet material progressively being transferred during the sliding or rolling movement to the starting position of the underlying sheet. Using such rolling or sliding transfer aids a patient can be repositioned without the attendant members of staff needing to lift the patient or exert any great effort to effect the movement.

In order to most efficiently effect the transfer of patients, a rolling or sliding transfer aid of the type described above should be provided with contact surfaces having as low a coefficient of friction as possible. For this purpose low-friction coatings may be applied to the material from which the sheet material is formed. Generally rolling or sliding transfer aids, whether of the flat sheet or closed tube type, have been made from a flexible woven sheet material. To allow manufacturers to maximise use of the material, generally provided to them in the form of a large roll, the warp and weft fibres of the material extend respectively in parallel

and perpendicular to the longitudinal edges of the transfer aid. In use, therefore, the warp fibres run in the general direction of movement of the aid during sliding or rolling and the weft fibres run generally perpendicular to that direction. During the sliding or rolling action the fibres so aligned are caused to move over one another transverse their width, thereby resulting in the need for the fabric to rise up and down over the minor asperities caused by the weave. Although those asperities are only small in scale the uneven movement caused thereby detrimentally affects the frictional resistance of the material increasing its coefficient of friction thereby decreasing its low-friction characteristic.

There is, therefore, a need to improve on existing rolling and sliding transfer aids and in particular to increase their efficiency of use by maximising the low-friction nature of the contacting rolling or sliding surfaces.

According to the present invention there is provided a patient transfer aid of the type where transfer is effected by the sliding or rolling of one layer of flexible woven sheet material having a low coefficient of friction over another, wherein during the sliding or rolling movement of normal use the warp and weft fibres of the two layers of material are inclined to the main

directional component of the sliding or rolling movement.

The warp and weft fibres of the two layers of material are preferably inclined to the main directional component of movement by an angle in the range of 20° to 70°.

As generally during use of a sliding or rolling patient transfer aid the main directional component of the movement is designed to be parallel to the longitudinal sides of the transfer aid, in the present invention the warp and weft fibres generally should be inclined to those longitudinal sides. Where, for example, the patient transfer aid involves the doubling back of the sheet material, the warp and weft fibres should be inclined to the open-ended sides of the tube formed by that folding or doubling back.

To ensure that the warp and weft fibres are inclined as required for the present invention, it has been found advantageous and efficient for the flexible, woven sheet material from which the patient transfer aid is formed to be cut on the bias during manufacture of the patient transfer aid. In this way the warp and weft fibres are automatically inclined to the longitudinal sides of the patient transfer aid and rolling or sliding movement of the aid with those sides superimposed so as to extend substantially in parallel automatically leads to rolling or sliding with the warp and weft fibres inclined to the

direction of movement.

It is preferred that the woven sheet material from which the patient transfer aid is manufactured is cut on the bias in such a way that the warp and weft fibres are inclined to the longitudinal sides of the aid at an angle in the range between 20° and 70°.

With the present invention it has been found that the uneven motion generated by use of conventional patient transfer aids is equalised out so that the sliding or rolling movement is exceptionally smooth and the coefficient of friction of the contacting surfaces can be minimised.

The presently claimed invention can be used for both open sheet or pre-manufactured tube patient transfer aids. Where the sheet is pre-manufactured into a tube by the overlapping or abutting of two of its opposing (lateral) edges, any joins should be as flat as possible so as not to hinder the sliding/rolling movement of the sheet in use.

The sheet material of the patient transfer aid may be formed from any suitable flexible, woven material. A plain weave is preferred for providing suitable flexibility to the material. The material is preferentially woven from strong threads having a

relatively low coefficient of friction. For hospital use the material from which any components of the patient transfer aid are made should be easily cleanable and steriliseable, so that materials using, e.g. fabrics woven from, synthetic filaments are preferred. The material or materials are also preferably waterproof, e.g. by means of a waterproof coating or using a sufficiently close weave. A particularly suitable fibre for use in the manufacture of the transfer aid is nylon™. Nylon of various breaking strains is commercially available and the breaking strain chosen will depend on the particular application of the patient transfer aid. It is preferred to use an anti-bacterial material in order to reduce cross-infection risks in hospitals and nursing homes.

Although at least one part or surface of the sheet material should have or be provided with a low-friction characteristic to enable the two layers to easily slide or roll on one another, the other surface may have or be provided with a higher coefficient of friction. The sheet could, for example, be manufactured with different coefficients of friction on its surfaces. Alternatively or additionally, to increase the low-friction characteristic of the contact faces of the patient transfer aid, it is possible to coat the material with a suitable low-friction coating, such as a silicone elastomer. Fabrics so coated are commercially available

with differential slip properties on their two faces. The patient transfer aid of the present invention is advantageously made from the commercially available product sold under the trade name Hyperlast. The material from which the patient transfer aid is manufactured may either be a single layer or a multi layer (composite) structure.

The patient transfer aids of the present invention may be provided in various sizes and shapes depending on the application to which they are intended. They may be shaped to accommodate differently sized patients. The aids may be of a size to cover a single hospital bed or for longitudinally displacing a patient between a sitting and a supine position. It will be appreciated that the magnitude of the transfer movements that can be effected with such an aid depend on its size and therefore aids may be provided in various sizes. The flexible nature of the aid allows it to be placed on surfaces with a single degree of curvature or over an edge, such as the edge of a bed, to assist in the transfer of a patient not just in a purely rectilinear direction but from one attitude to another, for example from a prostrate to a sitting position.

The patient transfer aid of the present invention may be provided with holding or grip means, e.g. handgrips to aid in its use in transferring a patient. Such holding

or grip means should be designed and positioned so as to enable any care assistants to adopt good, substantially upright posture when moving a patient and to avoid strain or twisting movements. The provision of handgrips allows the care assistant to act on the aid rather than on the patient, i.e. handgrips enable a tractive force to be exerted on the sheet itself to move the upper sheet on the lower and reduces or eliminates the need to push or pull the patient. Any grips provided not obstruct the sliding or rolling movement of the sheet material. Any such hand grips are preferentially provided on the peripheral edges of the transfer aid and positioned so that, if the aid is placed in a folded, i.e. doubled up, superimposed state, the collapsed tube so formed has at least two handgrips attached to the sheet material one at or adjacent each of the opposite ends of a generatrix of the tube. Such handgrips are usable to slide the upper layer and a patient supported thereon on the lower layer in a direction substantially perpendicular to the tube axis. Several grips may be provided around the circumference of the tube. The handgrips preferably take the form of a flat, flexible portion, e.g. a fabric strip or tape, co-planar or superimposed on the sheet material in such a way so as not to substantially increase the bulk of the material or stiffen it appreciatively. The fabric strips or tapes may be attached at either end so as to extend parallel to the edge of the sheet material and to allow the intermediate portion where they are not

so attached to be gripped. An additional tape around part of the circumference of the sheet material may be included in association with the handgrips to strengthen the edges of the aid. The position of the handgrips on the sheet material may be varied to accommodate differently sized patients. The handgrips may for this purpose vary in their distance from the central longitudinal axis of the patient transfer aid. Alternatively or additionally handgrips or handles may be positioned and constructed so as to allow a care assistant to effect a force on the transfer aid at a position remote therefrom. The handgrips may be formed from any suitable material such as those specified above. It is particularly preferred that any handgrips be formed from an anti-bacterial material.

The present invention is applicable to rolling or sliding transfer aids of the type having associated with the sheet material a laminar element which can be superimposed on a tube formed from the sheet material and urged, in use, in a direction generally transverse the tube axis to move together with the underlying upper layer of the tube with respect to the lower layer. With these type of aids a patient is positioned on the laminar member, which is in effect a patient support layer. An advantage of such aids is that it allows a patient to be transferred twice the distance that may be effected using a similarly sized rolling or sliding transfer aid without

an additional laminar member. With such aids the laminar member may be permanently or releasably attached to the sheet material, or tube formed therefrom, e.g. by the use of permanent or releasable fastening means. The use of high-friction, lightly adhesive materials, such as those sold by Dysen, is also known for such aids. Such materials allow a secure, non-slip contact to be made between facing surface which can be released easily by peeling one from the other. With such a material the laminar member may be non-permanently associated with the flexible sheet material. The laminar member may itself be provided with holding or grip means. It may be advantageously provided with handles allowing the remote use of force on the transfer aid, for which purpose the laminar element may be provided with long handles or straps permanently or releasably attached at suitable points.

For a better understanding of the present invention, and to show how the same may be put into effect, reference will now be made, for the purposes of illustration only, to the accompanying drawings in which:

Figure 1 is a perspective view of a first embodiment of a transfer aid according to the present invention;

Figure 2 is an enlarged schematic view of a detail of part of the transfer aid of Figure 1;

Figure 3 shows the transfer aid of Figures 1 and 2 in use for the transfer of a patient from the position

shown in Figure 3A to that shown in Figure 3B; and

Figure 4 illustrates the use of a second embodiment of a transfer aid according to the present invention.

The transfer aid generally indicated 1 in Figures 1 to 3 of the drawings comprises a rectangular sheet of fabric folded on itself so that two opposite edges 2 overlap and are seamed together to form an open-ended tube. The seam 2 is of minimum thickness so as not to obstruct the movement of the sheet material in use. The seam is stitched with nylon™ thread having a braking strain of 5kg. The aid 1 is shown in its condition of use in which the tube is collapsed, with an upper half-sheet 1a of the fabric lying on a lower-sheet 1b, the two layers being joined at fold lines 1c and 1d. The fabric constituting the sheet 1 is an extremely fine, plain weave nylon™ fabric, having a weight of 290g per m^2 so as to be substantially waterproof but extremely flexible. The woven fabric of the sheet material is cut on the bias (as shown schematically in Figure 2) so that the warp and/or weft fibres extend at an angle α which is in the range 20° to 70° to the longitudinal edge 1e of the sheet material, i.e. to the main directional component of the sliding or rolling movement of the transfer aid during use. One surface of the fabric, which constitutes the inner surface of the tube, also has a low-friction coating of a silicone elastomer. The coating rate is 60g per m^2. The two contacting, inner surfaces of the sheet 1 have low

coefficients of friction and due to the orientation of the warp and weft fibres of the material the upper half-sheet 1a will slide readily and exceptionally smoothly on the lower half-sheet 1b.

The aid 1 is provided with two 25mm wide, nylon™ edging tapes 3 attached to the outer face of the sheet 1 so as to completely surround the two respective open ends of the tube. The tapes 3 are seamed to the sheet 1 by longitudinal lines of stitching. The ends of the tapes 3 are butted together at 4, i.e. not overlapped which would form local regions of increased thickness and rigidity. Moreover, the butted ends 4 of the tapes 3 are spaced from the seam 2 in the sheet 1 so as to minimise any further increase in the rigidity of the sheet at this point and to enhance the overall robustness of the aid. Each tape 3 has a portion 6 which is not longitudinally stitched to the sheet 1. The portion 6 is of sufficient length to be gripped by a hand inserted between the tape portion 6 and the adjacent sheet 1 and this constitutes a handgrip of the aid. It should be noted that, in the drawings, the spacing between the handgrip portion 6 and the sheet 1 has been exaggerated for clarity of explanation. In practice, when the sheet 1 is flat, the handgrip portion 6 is flush with it. Although two opposing handgrips are shown in Figure 1 several may be provided spaced circumferentially around the tube.

In use, as shown in Figures 3A and 3B, the aid 10 may be placed on a bed B and a patient P is manoeuvred into a position in which they are sitting on the doubled tubular fabric 1 with their legs arched. From this position they may be moved back up the bed, into the position shown in Figure 3B. First the aid 1 is arranged with the handgrips 6 beneath the patient's thighs. The two nurses N place themselves on either side of the patient P facing in the same direction as the patient and partly kneeling on the bed. In this position they can support the patient with one arm through their arm and, by leaning forward, can both grasp one of the handgrips 6 whilst continuing to support the patient. The nurses then pull the handgrips 6 in a direction as shown by the arrow A perpendicular to the tube axis. This slides the upper half-sheet 1a on the lower half-sheet 1b making the entire aid move along the bed B in the direction of the arrow A and carrying the patient P with it, to the position shown in Figure 3B. The movement is achieved without the need for the nurses to support the full weight of the patient's body.

The second embodiment of the present invention (see Figure 4) is a tube of flexible material substantially as described in relation to Figures 1 to 3, but with a laminar element or sheet 7, which acts as a patient support device, lying on top of the collapsed tube 8. Elongate straps 9 having a plurality of handgrips are

provided on the laminar element 7.

Shown diagrammatically in Figure 4 is in an illustration of the use of the second embodiment to transfer a patient P from one bed B1 to a second, adjacent bed B2. The laminar element 7 is placed completely on the first bed B1, beneath the patient P, but with the underlying rolling transfer tube 8 partly overlapping the bed B2. The care assistant C stands at the opposite side of the second bed B2 from the bed B1 and grasps the handgrip nearest the free end of the pulling strap 9. At least one other assistant (not shown) will preferably also grasp another similarly positioned pulling strap 9. The care assistant C, standing upright, than pulls the strap 9 towards themselves causing the laminar element 7 with the patient P to slide on the rolling transfer tube 8 until the aid reaches the position shown in Figure 4b. Here the laminar element 7 spans the gap between the beds B1 and B2. From there the care assistant continues to pull the strap 9, still standing upright and drawing the elongated strap towards themselves. In due course the position shown in Figure 4c is reached in which the laminar element 7 and the patient P has been transferred completely to the second bed B2.

CLAIMS

1. A patient transfer aid of the type where transfer is effected by the sliding or rolling of one layer of flexible woven sheet material having a low coefficient of friction over another, wherein during the sliding or rolling movement of normal use the warp and weft fibres of the two layers of material are inclined to the main directional component of the sliding or rolling movement.

2. A patient transfer aid according to Claim 1, wherein the warp and weft fibres are inclined by an angle in the range 20° to 70°.

3. A patient transfer aid according to Claim 1 or 2, wherein the flexible woven sheet material is cut on the bias during manufacture of the aid.

4. A patient transfer aid according to any one of Claims 1 to 3, wherein the sheet material is in the form if a readymade tube.

5. A patient transfer aid according to any preceding claim, wherein at least one holding or grip means is provided, with that holding or grip means being formed from an anti-bacterial material.

6. A patient transfer aid substantially as hereinbefore

described with reference to and as illustrated in Figures 1 to 3 and Figure 4 of the accompanying drawings.

The Patent Office

17

INVESTOR IN PEOPLE

Application No:	GB 9813380.4	**Examiner:**	Dave McMunn
Claims searched:	1-6	**Date of search:**	15 March 1999

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.Q): B8H (HLD).

Int Cl (Ed.6): A61G7/10.

Other: ONLINE: WPI, EDOC, JAPIO.

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
A	WO 96/14817 A1	(NORRIS). Note arrows 18	1
A	WO 96/06550 A1	(LINDBERG). Note zones 4,5	1
A	US 4,944,053	(SMITH). Note arrow 28	1

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.